

## Synthesis Lab

Exploring the reaction of Mg with O<sub>2</sub>

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### Purpose:

To find the empirical formula of a substance and study the properties of a synthesis reaction.

Students are also to practice use of proper and safe lab techniques.

The reaction:  $\text{Mg(s)} + \text{O}_2\text{(g)} \rightarrow \text{? (s)}$

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### Materials:

- Bunsen burner
- Hose
- Striker
- Balance
- Crucible and lid
- Paper towels
- Goggles
- Ring stand
- Clay triangle
- Tongs
- Hot vessel holder
- Magnesium ribbon

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### Procedure:

1. Gather your materials (enough to work in teams of two). Put on your goggles and leave them on until the teacher tells you when to take them off.
2. Place a clean and dry crucible and lid on the balance and record its mass. Record your data on your data table.
3. Obtain a piece of magnesium ribbon (about 15 mm in length) and cut into smaller pieces. Place the cut pieces of magnesium in the crucible and cover the crucible with its lid. Place crucible, its contents and lid on the balance and record its mass on your data table.

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### Procedure (cont.):

4. Set up your ring stand and Bunsen burner. Place the ring about three-quarters of above the base of the ring stand. Make sure that the ring is secure. Place the clay triangle on the ring.
5. Place the crucible with contents and lid into the clay triangle.
6. Light your Bunsen burner with a striker and place directly below the crucible. Heat the crucible on a high flame.

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### Procedure (cont.):

7. Using the tongs, remove the lid from the crucible every thirty seconds to prevent the lid from suctioning onto the crucible. Take care not to drop the lid.
8. Continue to heat until the metal inside the crucible glows brightly and turns into a white powder-like substance. CAUTION: Do not look directly at the metal when it flashes.
9. Heat for a few minutes beyond the time in which the metal turned white.

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### Procedure:

10. Turn off your Bunsen burner and allow the crucible to cool down. Leave the crucible and lid on the clay triangle until cool enough to place on balance.
11. Using your hot vessel holder, place the cool crucible and lid on the balance. Record the mass of the crucible, lid and metal after heating on your data table.

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### Procedure (cont.):

12. After recording your final data entry, clean up your area. Be careful not to burn yourself with the ring stand. Dump the contents of the crucible into the container specified by your teacher. Rinse the crucible and lid in the sink and dry.
13. Dry off your equipment and return all pieces back to their respective places.

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### Data Table:

Mass of crucible and lid (g)	
Mass of crucible and lid with Mg metal (g)	
Mass of crucible, lid and metal after heating (g)	

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### Calculations:

1. Using your data table, find the mass of Mg metal before heating: \_\_\_\_\_
2. Using your data table, find the mass of the product after heating: \_\_\_\_\_
3. Using your data table, find the mass of oxygen on the metal : \_\_\_\_\_
4. Solve for moles of Mg: \_\_\_\_\_
5. Solve for moles of  $O_2$ : \_\_\_\_\_
6. Find your mole ratios. This will give you the empirical formula for the magnesium oxide product. What is your value? \_\_\_\_\_
7. What should the empirical formula have been? Explain your results and possible sources of error.

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### Conclusion:

1. Why is this lab an example of a synthesis reaction?
2. Why was heat needed?
3. What evidence served as proof that the reaction took place?
4. What should the balanced equation for the reaction be?
5. Use another sheet of paper if needed.

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